14889 - HD 93 129 A: a new collision of two powerful winds and possibly of their sourcesSprObs

Cycle: 24, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) HD93129A ANY	ACS/WFC STIS/CCD STIS/FUV-MAMA WFC3/UVIS	1	18-Apr-2019 17:00:17.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
02	(1) HD93129A ANY	ACS/WFC STIS/CCD STIS/FUV-MAMA WFC3/UVIS	1	18-Apr-2019 17:00:19.0	yes
03	(1) HD93129A ANY	ACS/WFC STIS/CCD STIS/FUV-MAMA WFC3/UVIS	1	18-Apr-2019 17:00:21.0	yes
04	(1) HD93129A ANY	ACS/WFC STIS/CCD STIS/FUV-MAMA WFC3/UVIS	1	18-Apr-2019 17:00:23.0	yes
05	(1) HD93129A ANY	ACS/WFC STIS/CCD STIS/FUV-MAMA WFC3/UVIS	1	18-Apr-2019 17:00:24.0	yes
06	(1) HD93129A ANY	ACS/WFC STIS/CCD STIS/FUV-MAMA WFC3/UVIS	1	18-Apr-2019 17:00:26.0	yes
07	(1) HD93129A ANY	ACS/WFC STIS/CCD STIS/FUV-MAMA WFC3/UVIS	1	18-Apr-2019 17:00:27.0	yes

7 Total Orbits Used

ABSTRACT

Multiplicity among massive stars is an endemic disease that can severely impact their evolution. We propose multi-epoch FUV high-resolution spectroscopy of HD 93 129 A, one of the most massive multiple systems in the Galaxy, for which we have just discovered that the previously known

outer orbit will pass though an extremely close periastron within the next two years, possibly as early as March 2017. The event will cause an unprecedented collision between the powerful winds of two O2 If* supergiants passing at a distance of one to a few AU that we will study using the changes in the wind profiles of FUV lines. We have also discovered that one of the stars is quite likely a tight binary and that it is possible that the resulting three-body interaction near periastron may lead to a stellar collision or a stellar ejection. Our proposed spectroscopic observations will constrain the properties of the inner orbit prior to periastron and could be crucial for the determination of the initial conditions of the catastrophic event if it indeed occurs, something that could not be easily done after the fact. If such an event does not take place, it is still likely that the inner orbit will be perturbed by the encounter, so the pre-periastron observations would be used to study the extent of the perturbation. The reasons for proposing at mid cycle are that (a) most of the above was unknown at the time of the last call for proposals and (b) we need the first observations as soon as possible to ensure they are taken before periastron.

OBSERVING DESCRIPTION

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June 11th, 2018

One additional visit without any timing constraints activated.

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Feb 7th, 2018

We activate two additional visits.

The configuration is the same as in Visits 1 and 2, therefore the BOT and other checks still apply.

The only differences are the scheduling constraints. We request now that both visits are executed within ~3.25 days from one another, with *no* restriction on the orbital phase.

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Summary

The observations consist on seven identical 1-orbit long visits of the triple system HD93129A near periastron, when the system will experience a very close and intense dynamical interaction.

The goal is to obtain high resolution FUV spectra with the E140M echelle of the STIS FUV-MAMA, to cover the 1144-1710\AA range with resolution R~45800. The full system (HD93129Aa1,Aa2,Ab) will be included in the spectrum.

Scheduling constraints are critical (see below).

We use a similar observing configuration for HD93129A to proposal 13346 (PI Ayres), already executed and successful.

Scheduling requirements:

. ORIENT: none

. TIMING CONSTRAINTS:

HD93129A is a triple star, with 2 stars (Aa1,Aa2) in an inner orbit, and the 3rd star (Ab) orbiting them. The inner system has a period of about 14 days, and we want to observe two contiguous eclipses (~0.25,~0.75). These are the first 2 visits of our proposal.

The external star (Ab) is about to reach periastron, leading to a very strong dynamical interaction.

We would like our 2 first visits to be scheduled before that moment. Our orbital solution is still not accurate enough to know the exact date, though our simulations favor March 2017. Hence the urgency to execute them asap (as we explained in the phase-1 proposal).

We keep the rest of the orbits on hold until we can derive an improved orbital solution from our programmed VLT-PIONEER observations, to be executed in early 2017.

. NOTE ON SCHEDULABILITY:

The maximum priority of this program is to schedule the visits as the binary system demands. Before setting any Timing Requirements, we fiddled with the visit planner to ensure that no other factor decreased visibility.

We noted that adjusting the main STIS science exposures to fully span the extent of the orbit reduced the visibility windows by almost 50%. This reduction was independent of the orbit length. Leaving part of the orbital visibility unused, and allowing the STIS buffer dump and the spacecraft return to home to happen before Occultation, resulted in a 100% schedulability of the visit. Since we still achieved our SNR requirements with the decreased exposure time, we adopted this strategy.

Photometric and reddening data for the target:

The extinction parameters were calculated from detailed multi-wavelength analysis by J.Maiz, with CHORIZOS.

V=7.31 \pm 0.02 ; this V-mag includes the full system (Aa1, Aa2, Ab)
EBV=0.514 \pm 0.010
Rv=4.22 \pm 0.12

There is a nearby object at 2.6", HD93129B, fully resolved by STIS.
Historically, HD93129A+HD93129B could not be resolved from the ground and their combined magnitude is V=7.03 .

Target confirmation charts:

Target cannot be seen, charts are saturated.

Acquisition Strategy:

- There is a nearby object at 2.6", HD93129B with V=8.84 (SIMBAD)
The object should not threat the ACQ algorithm, as the star is more than 1mag fainter than the main target (HD93129A, V=7.31).

- Target will be acquired in 2 steps:
. The ACQ imaging algorithm was performed with the F28x50OII aperture
. ACQ/PEAK, mandatory for slits smaller than 0.1"

Exposure times, primary obs., STIS-FUV-E140M:

HD93129A has been recently observed in the UV by proposal 13346 (PI Ayres). The spectra were taken with STIS-FUV-E140M and the 0.2x0.09 slit. These observations are both a guideline and proof of the safety+feasibility of our observations.

In particular, we used the flux at 1500\AA measured from the resulting spectra of proposal 13346 as reference to calculate the exposure times and assess MAMA safety.

We used the STIS Spectroscopic ETC, version 24.2, with input parameters:
- Point source, default settings
- Castelli & Kurucz for O3V star
- Rv=4.0, *before* normalization; EBV=0.514
- Normalization at 1500\AA, F = 3.4E-11 erg/cm2/s/A, with option "Bandpass selected above in Question-1"
- Std airglow, bkgd, zodiacal

We have broken the STIS observations in 3 exposures of 537s each. (This strategy leaves part of the orbital visibility unused in order to enhance

schedulability, see above). The exposure time was broken in 3 exposures to recover temporal information, since ACCUM mode had to be used due the target brightness. The expected resulting SNR of the final combined spectrum is 95.

Bright object concerns, STIS-FUV-E140M:

As we explained before, the existing STIS-FUV-E140M exposures of HD93129A proof the safety+feasibility of our observations.

Proposal 13346 executed 2 exposures of 1318s each, with the 0.2x0.09 slit. According to our orbital solution of the binary system, their spectrum also contained the full system (Aa1,Aa2,Ab) and we do not expect any variation of the source flux.

Our program uses shorter 537s exposures with a narrower 0.2x0.06 slit. Hence we expect both less total counts (shorter Texp) and a smaller count rate (smaller slit).

Checks in the ETC:

. STIS-FUV-E140M 0.2x0.06

We used the ETC with the parameters listed above (point source, O3V star), normalized with the flux at 1500\AA from proposal 13346, to assess MAMA safety.

We get a warning regarding MAMA Bright limits: "total count rate per image 128586 exceeds limit for irregularly-variable sources 40 percent of the bright limit 200000 counts per second". Our target is not irregularly-variable at the moment. However, we will be monitoring the target from Earth to better constrain the orbit of the system. If there was any increased activity due to the (Aa,Ab) close periastron passage, we will detect it.

APT's Bright Object Tool

- No GALEX coverage of the region.

- The BOT reports an unkown source of V=8.77, about 2" away. We found no counterpart in any existing HST data!.
Yet, as a safety check, we input this star into the ETC for ACQ,ACQ/PEAK and STIS-FUV-E140M.
We selected the worst case point source (O3V Castelli Kurucz).
Since the star would be close to HD93129A, we used its same reddening parameters.
The target is safe to the three observing modes.

- As we explained above there is a nearby object, HD93129B (V=8.84, Simbad) 2.6" away from our target. We realize that it could be the Unknown detected by the BOT, although their position does not match.
HD93129B will not enter the 0.2x0.06 slit, but may impact the larger ACQ exposure.
We input the combined magnitude of HD93129A+HD93129B, V=7.03, into the ACQ-ETC with the same input parms. as HD93129A.
Observations are safe.

PARALLELS:

We request serendipitous parallel observations with ACS and WFC3. Most of the exposures are very short (~0.5s) with the goal of obtaining unsaturated images of the brightest stars in the Carina nebula. Considering the limited number of exposures imposed by the buffer dumps, it is more beneficial to our program to include several filters rather than duplicating one of them, and no CR-SPLIT was used. (The risk of CR incidence with this Texp is very low and, since we cannot do dithering in parallels, we could not remove bad pixels anyway).

We inserted a longer (unneeded) 65s exposure to force the ACS dump.

WFC3: Exposure times are short, with very low bkgd levels. We will inject a 12e- POST-FLASH to minimize CTE issues.

Visit

Proposal 14889, PHASE 0.27 (01), completed Thu Apr 18 21:00:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC, STIS/CCD, STIS/FUV-MAMA

Special Requirements: BEFORE 31-JAN-2017:00:00:00; Period 14.527 D AND ZERO-PHASE HJD2457745.06

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.4620 (160.9894250d) Dec: -59 32 51.27 (-59.54757d) Equinox: J2000	Proper Motion RA: -5 mas/yr Proper Motion Dec: +17 mas/yr Parallax: 0.0" Epoch of Position: 2000	V=7.31+/-0.02 O2If*; E(B-V)=0.514 \pm 0.010 ; F(1500A)=3.4E-11 erg/cm2/s/ A	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERGIANT O]
Extended=NO

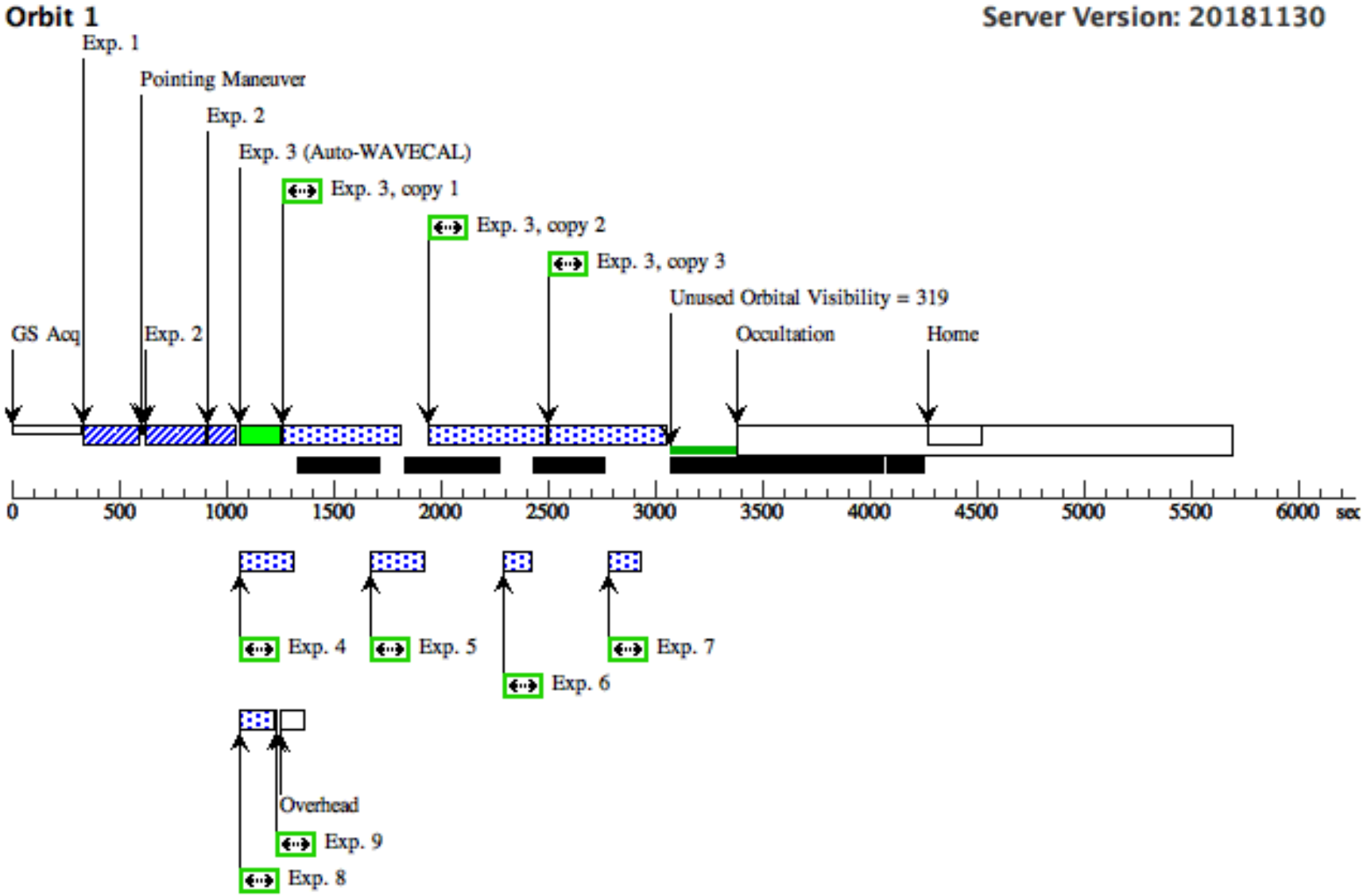
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1 (STIS.ta.847659)	(1) HD93129A	STIS/CCD, ACQ, F28X50OII	MIRROR		PHASE 0.25279068 TO 0.28720934		0.3 Secs (0.3 Secs) *[==>]*	***[1]***
2	ACQ2 (STIS.sp.847653)	(1) HD93129A	STIS/CCD, ACQ/PEAK, 0.2X0.06	G430L 4300 A				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	SCI-STIS (STIS.sp.847905)	(1) HD93129A	STIS/FUV-MAMA, ACCUM, 0.2X0.06	E140M 1425 A			Prime + Parallel Group 3-9 in PHASE 0.27 (01)	537 Secs X 3 (1611 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***

Comments: Input target parameters for ETC:
Point source, default settings
Castelly & Kurucz for O3V star
*Rv=4.0, *before* normalization; EBV=0.514*
Normalization: F(1500\AA) = 3.4E-11 erg/cm2/s/A, "Bandpass selected above in Question-1"
Std airglow, bkgd, zodiacal

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	ACS-F435 W-short	ANY	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 3-9 in PHASE 0.27 (01)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
5	ACS-F550 M-long	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in PHASE 0.27 (01)	65 Secs (65 Secs) *[==>]*	***[1]***
6	ACS-F550 M-short	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in PHASE 0.27 (01)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
7	ACS-F850L P-short	ANY	ACS/WFC, ACCUM, WFC	F850LP			Prime + Parallel Group 3-9 in PHASE 0.27 (01)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
8	WFC3-F336 W-short	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in PHASE 0.27 (01)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
9	WFC3-F336 W-med	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in PHASE 0.27 (01)	5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 14889, PHASE 0.84 (02), completed Thu Apr 18 21:00:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC, STIS/CCD, STIS/FUV-MAMA

Special Requirements: AFTER 01 BY 3 D TO 12 D; BEFORE 31-JAN-2017:00:00:00; Period 14.527 D AND ZERO-PHASE HJD2457745.06

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.4620 (160.9894250d) Dec: -59 32 51.27 (-59.54757d) Equinox: J2000	Proper Motion RA: -5 mas/yr Proper Motion Dec: +17 mas/yr Parallax: 0.0" Epoch of Position: 2000	V=7.31+/-0.02 O2If*; E(B-V)=0.514 \pm 0.010 ; F(1500A)=3.4E-11 erg/cm2/s/ A	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERGIANT O]
Extended=NO

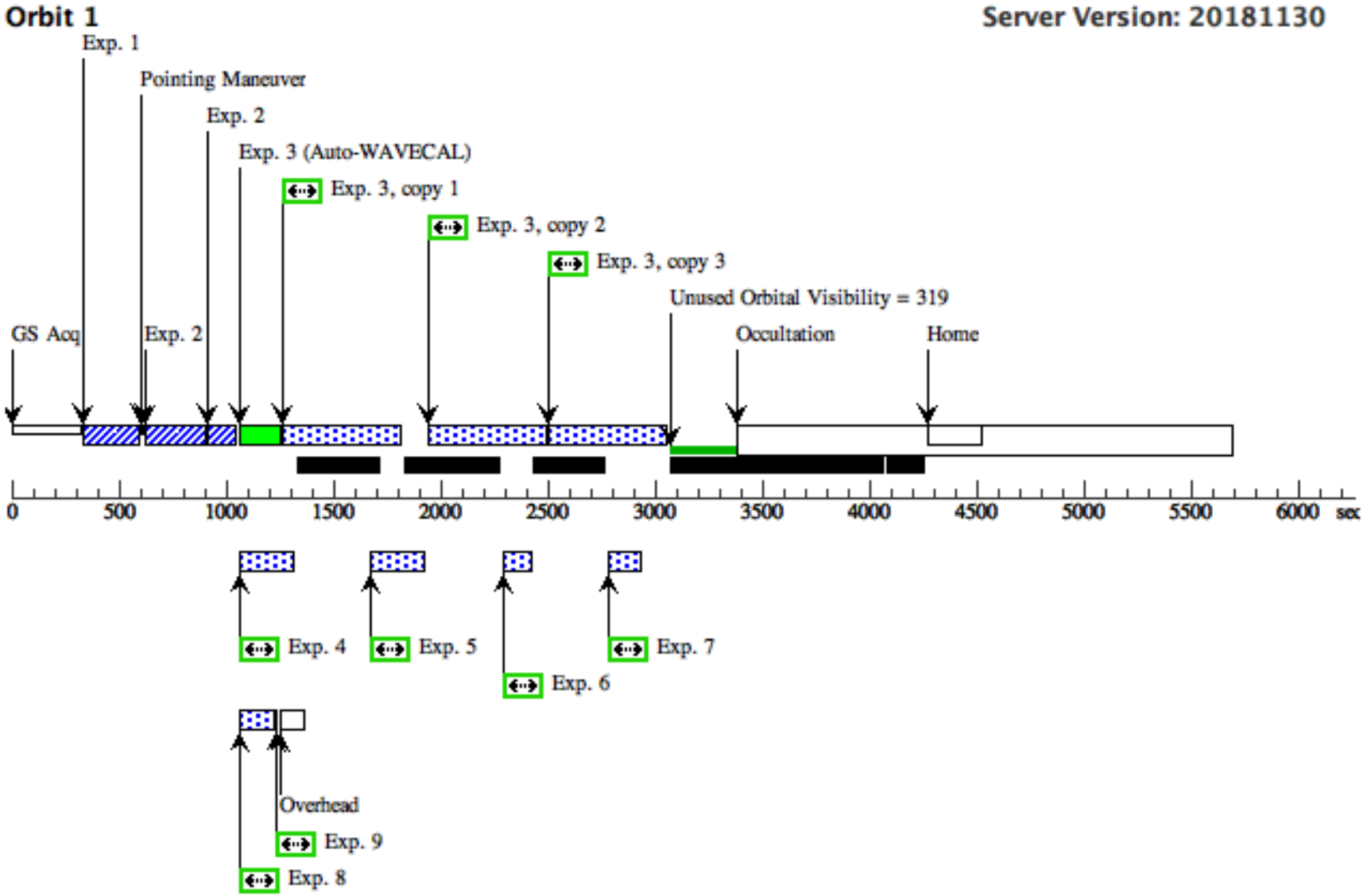
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1 (STIS.ta.847 659)	(1) HD93129A	STIS/CCD, ACQ, F28X50OII	MIRROR		PHASE 0.819922 T O 0.862		0.3 Secs (0.3 Secs) *[==>]*	***[1]***
2	ACQ2 (STIS.sp.84 7653)	(1) HD93129A	STIS/CCD, ACQ/PEAK, 0.2X0.06	G430L 4300 A				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	SCI-STIS (STIS.sp.84 7905)	(1) HD93129A	STIS/FUV-MAMA, ACCUM, 0.2X0.06	E140M 1425 A			Prime + Parallel Gro up 3-9 in PHASE 0.8 4 (02)	537 Secs X 3 (1611 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***

Comments: Input target parameters for ETC:
Point source, default settings
Castelly & Kurucz for O3V star
*Rv=4.0, *before* normalization; EBV=0.514*
Normalization: F(1500\AA) = 3.4E-11 erg/cm2/s/A, "Bandpass selected above in Question-1"
Std airglow, bkgd, zodiacal

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	ACS-F435 W-short	ANY	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Gro up 3-9 in PHASE 0.8 4 (02)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
5	ACS-F550 M-long	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Gro up 3-9 in PHASE 0.8 4 (02)	65 Secs (65 Secs) *[==>]*	***[1]***
6	ACS-F550 M-short	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Gro up 3-9 in PHASE 0.8 4 (02)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
7	ACS-F850L P-short	ANY	ACS/WFC, ACCUM, WFC	F850LP			Prime + Parallel Gro up 3-9 in PHASE 0.8 4 (02)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
8	WFC3-F336 W-short	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Gro up 3-9 in PHASE 0.8 4 (02)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
9	WFC3-F336 W-med	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Gro up 3-9 in PHASE 0.8 4 (02)	5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 14889, 2018_visit1 (03), completed Thu Apr 18 21:00:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC, STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.4620 (160.9894250d) Dec: -59 32 51.27 (-59.54757d) Equinox: J2000	Proper Motion RA: -5 mas/yr Proper Motion Dec: +17 mas/yr Parallax: 0.0" Epoch of Position: 2000	V=7.31+/-0.02 O2If*; E(B-V)=0.514 \pm 0.010 ; F(1500A)=3.4E-11 erg/cm2/s/ A	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERGIANT O]
Extended=NO

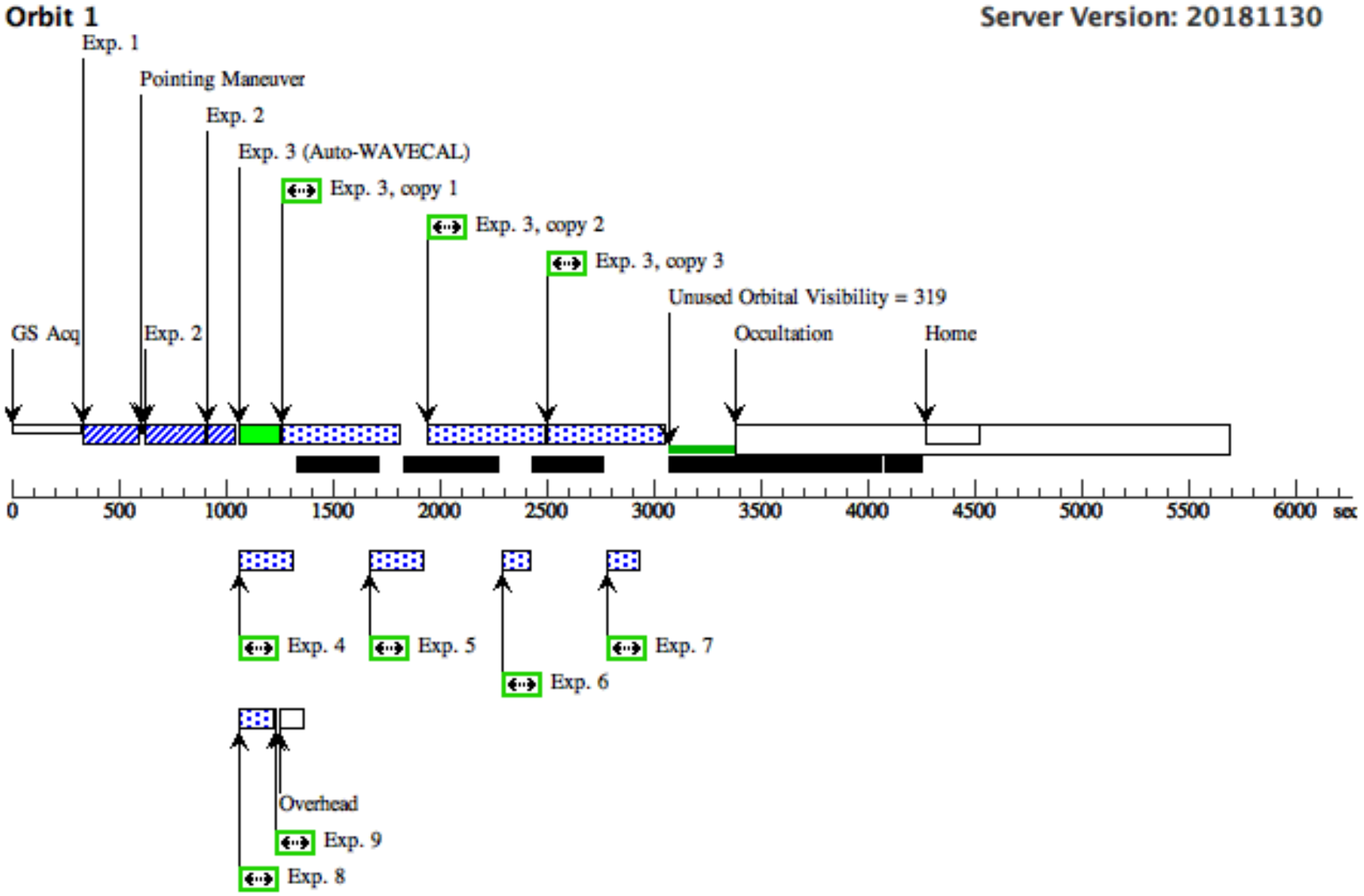
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1 (STIS.ta.847659)	(1) HD93129A	STIS/CCD, ACQ, F28X50OII	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	***[1]***
2	ACQ2 (STIS.sp.847653)	(1) HD93129A	STIS/CCD, ACQ/PEAK, 0.2X0.06	G430L 4300 A				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	SCI-STIS (STIS.sp.847905)	(1) HD93129A	STIS/FUV-MAMA, ACCUM, 0.2X0.06	E140M 1425 A			Prime + Parallel Group 3-9 in 2018_visit1 (03)	537 Secs X 3 (1611 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***

Comments: Input target parameters for ETC:
Point source, default settings
Castelly & Kurucz for O3V star
*Rv=4.0, *before* normalization; EBV=0.514*
Normalization: F(1500\AA) = 3.4E-11 erg/cm2/s/A, "Bandpass selected above in Question-1"
Std airglow, bkgd, zodiacal

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	ACS-F435W-short	ANY	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 3-9 in 2018_visit1 (03)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
5	ACS-F550M-long	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit1 (03)	65 Secs (65 Secs) *[==>]*	***[1]***
6	ACS-F550M-short	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit1 (03)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
7	ACS-F850LP-short	ANY	ACS/WFC, ACCUM, WFC	F850LP			Prime + Parallel Group 3-9 in 2018_visit1 (03)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
8	WFC3-F336W-short	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit1 (03)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
9	WFC3-F336W-med	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit1 (03)	5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 14889, 2018_visit2 (04), completed Thu Apr 18 21:00:29 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC, STIS/CCD, STIS/FUV-MAMA

Special Requirements: AFTER_03 BY 2.75 D TO 3.75 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.4620 (160.9894250d) Dec: -59 32 51.27 (-59.54757d) Equinox: J2000	Proper Motion RA: -5 mas/yr Proper Motion Dec: +17 mas/yr Parallax: 0.0" Epoch of Position: 2000	V=7.31+/-0.02 O2If*; E(B-V)=0.514 \pm 0.010 ; F(1500A)=3.4E-11 erg/cm2/s/ A	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERGIANT O]
Extended=NO

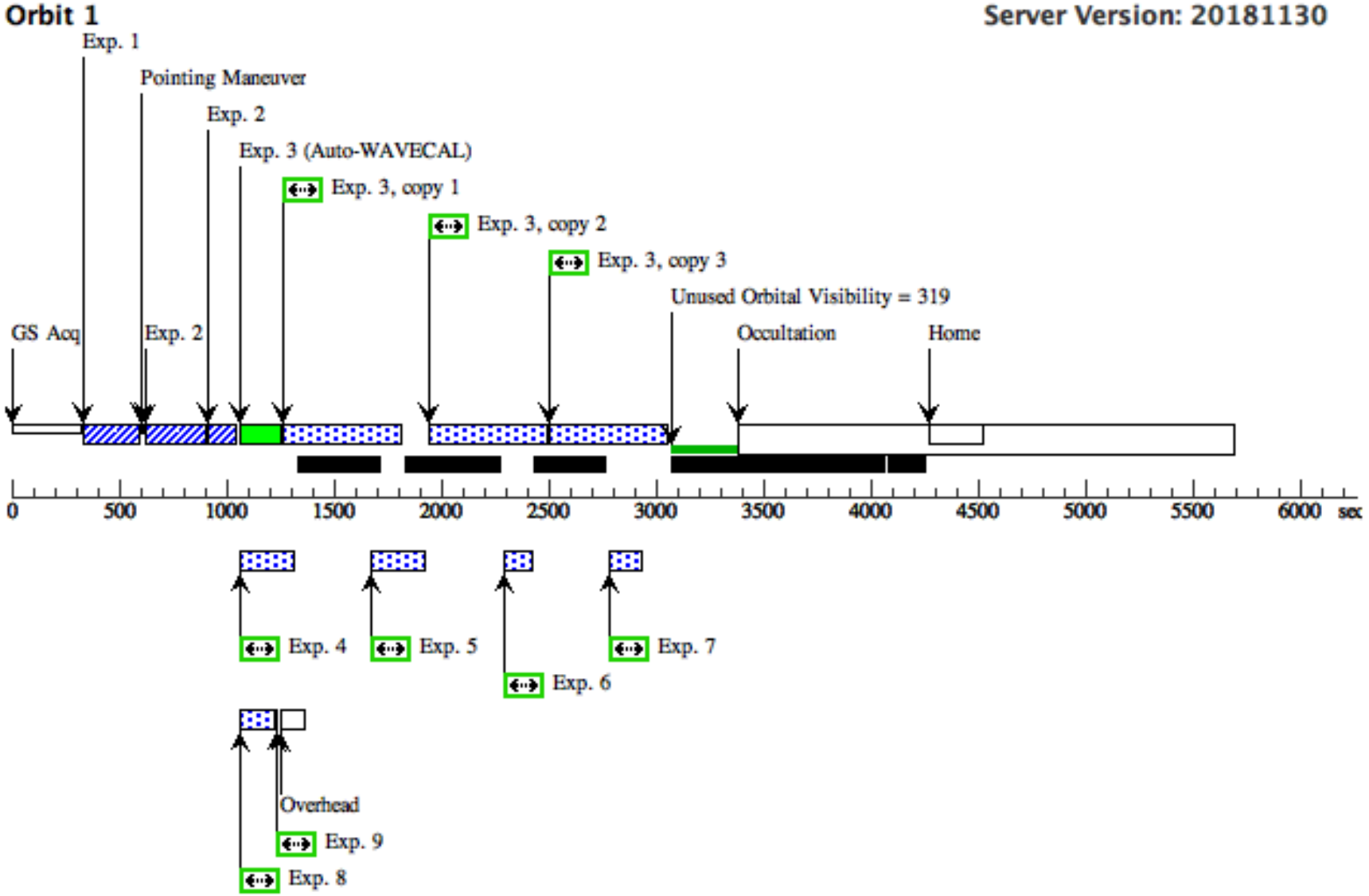
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1 (STIS.ta.847659)	(1) HD93129A	STIS/CCD, ACQ, F28X50OII	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	***[1]***
2	ACQ2 (STIS.sp.847653)	(1) HD93129A	STIS/CCD, ACQ/PEAK, 0.2X0.06	G430L 4300 A				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	SCI-STIS (STIS.sp.847905)	(1) HD93129A	STIS/FUV-MAMA, ACCUM, 0.2X0.06	E140M 1425 A			Prime + Parallel Group 3-9 in 2018_visit2 (04)	537 Secs X 3 (1611 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***

Comments: Input target parameters for ETC:
Point source, default settings
Castelly & Kurucz for O3V star
*Rv=4.0, *before* normalization; EBV=0.514*
Normalization: F(1500\AA) = 3.4E-11 erg/cm2/s/A, "Bandpass selected above in Question-1"
Std airglow, bkgd, zodiacal

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	ACS-F435W-short	ANY	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 3-9 in 2018_visit2 (04)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
5	ACS-F550M-long	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit2 (04)	65 Secs (65 Secs) *[==>]*	***[1]***
6	ACS-F550M-short	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit2 (04)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
7	ACS-F850LP-short	ANY	ACS/WFC, ACCUM, WFC	F850LP			Prime + Parallel Group 3-9 in 2018_visit2 (04)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
8	WFC3-F336W-short	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit2 (04)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
9	WFC3-F336W-med	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit2 (04)	5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 14889, 2018_visit3 (05), failed Thu Apr 18 21:00:29 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC, STIS/CCD, STIS/FUV-MAMA

Special Requirements: AFTER 31-MAY-2018:00:00:00

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.4620 (160.9894250d) Dec: -59 32 51.27 (-59.54757d) Equinox: J2000	Proper Motion RA: -5 mas/yr Proper Motion Dec: +17 mas/yr Parallax: 0.0" Epoch of Position: 2000	V=7.31+/-0.02 O2If*; E(B-V)=0.514 \pm 0.010 ; F(1500A)=3.4E-11 erg/cm2/s/ A	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERGIANT O]
Extended=NO

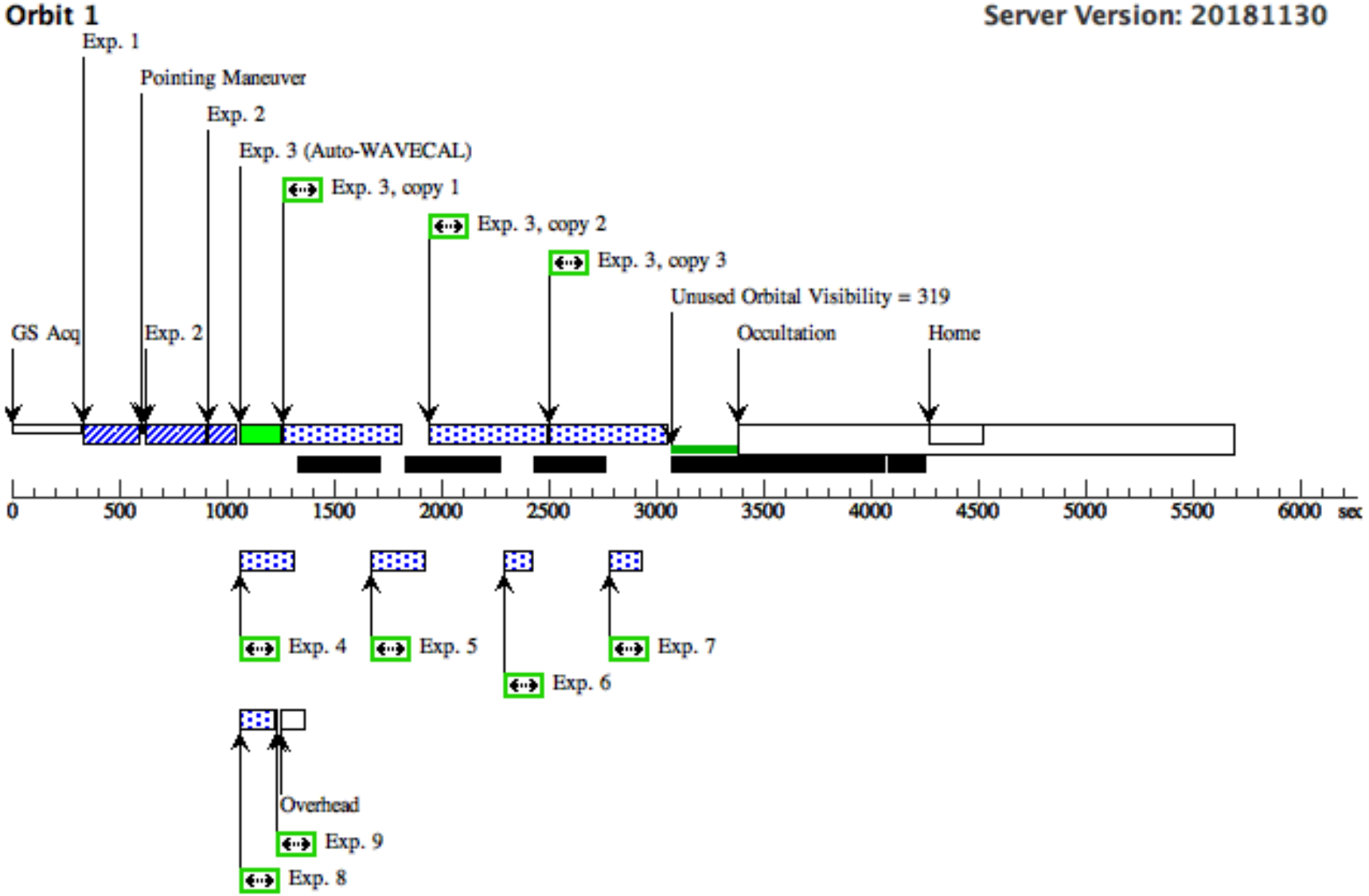
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1 (STIS.ta.847659)	(1) HD93129A	STIS/CCD, ACQ, F28X50OII	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	***[1]***
2	ACQ2 (STIS.sp.847653)	(1) HD93129A	STIS/CCD, ACQ/PEAK, 0.2X0.06	G430L 4300 A				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	SCI-STIS (STIS.sp.847905)	(1) HD93129A	STIS/FUV-MAMA, ACCUM, 0.2X0.06	E140M 1425 A			Prime + Parallel Group 3-9 in 2018_visit3 (05)	537 Secs X 3 (1611 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***

Comments: Input target parameters for ETC:
Point source, default settings
Castelly & Kurucz for O3V star
*Rv=4.0, *before* normalization; EBV=0.514*
Normalization: F(1500\AA) = 3.4E-11 erg/cm2/s/A, "Bandpass selected above in Question-1"
Std airglow, bkgd, zodiacal

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	ACS-F435W-short	ANY	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 3-9 in 2018_visit3 (05)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
5	ACS-F550M-long	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit3 (05)	65 Secs (65 Secs) *[==>]*	***[1]***
6	ACS-F550M-short	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit3 (05)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
7	ACS-F850LP-short	ANY	ACS/WFC, ACCUM, WFC	F850LP			Prime + Parallel Group 3-9 in 2018_visit3 (05)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
8	WFC3-F336W-short	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit3 (05)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
9	WFC3-F336W-med	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit3 (05)	5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 14889, 2018_visit4 (06), completed Thu Apr 18 21:00:29 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC, STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.4620 (160.9894250d) Dec: -59 32 51.27 (-59.54757d) Equinox: J2000	Proper Motion RA: -5 mas/yr Proper Motion Dec: +17 mas/yr Parallax: 0.0" Epoch of Position: 2000	V=7.31+/-0.02 O2If*; E(B-V)=0.514 \pm 0.010 ; F(1500A)=3.4E-11 erg/cm2/s/ A	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERGIANT O]
Extended=NO

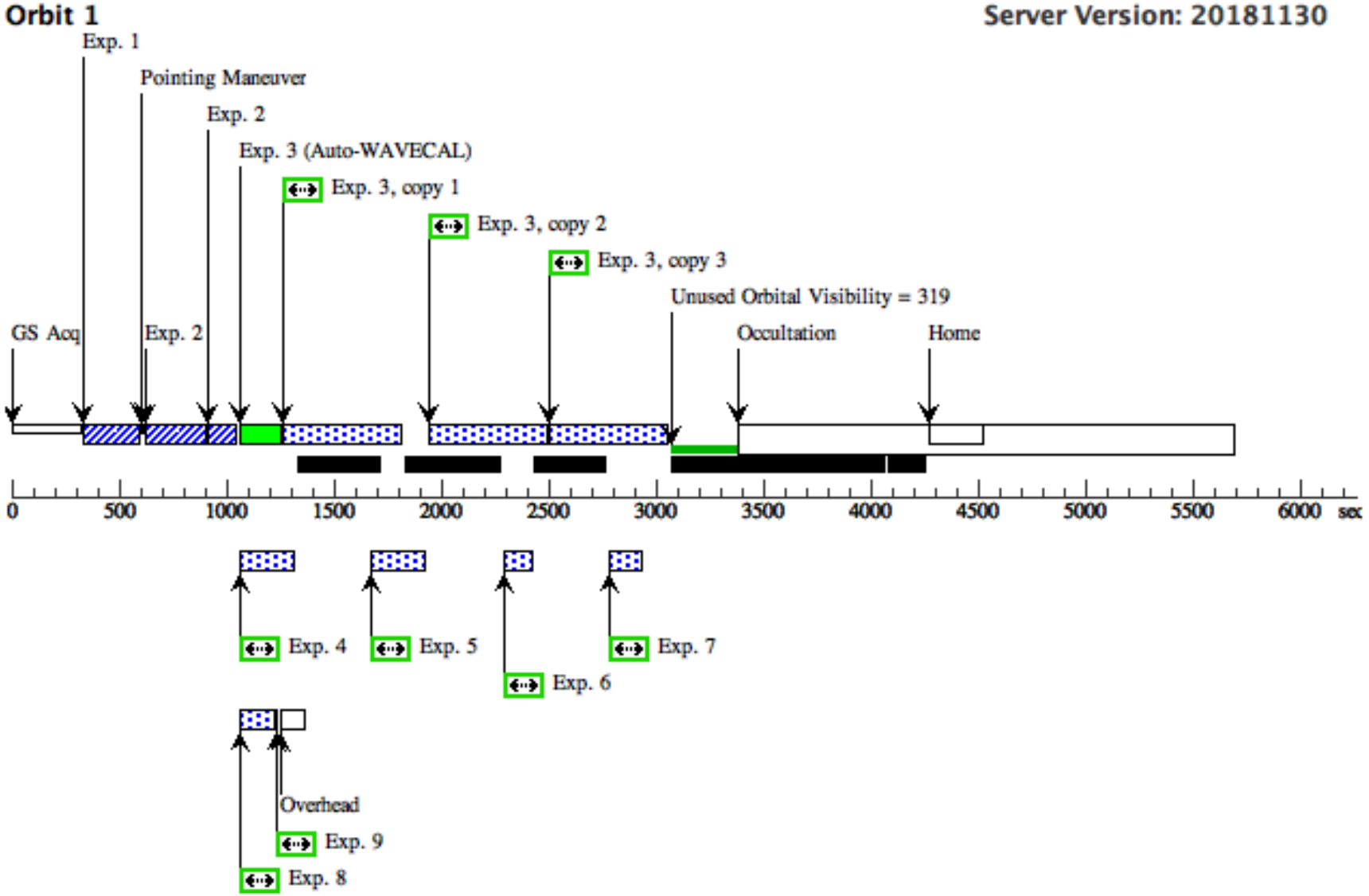
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1 (STIS.ta.847659)	(1) HD93129A	STIS/CCD, ACQ, F28X50OII	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	***[1]***
2	ACQ2 (STIS.sp.847653)	(1) HD93129A	STIS/CCD, ACQ/PEAK, 0.2X0.06	G430L 4300 A				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	SCI-STIS (STIS.sp.847905)	(1) HD93129A	STIS/FUV-MAMA, ACCUM, 0.2X0.06	E140M 1425 A			Prime + Parallel Group 3-9 in 2018_visit4 (06)	537 Secs X 3 (1611 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***

Comments: Input target parameters for ETC:
Point source, default settings
Castelly & Kurucz for O3V star
*Rv=4.0, *before* normalization; EBV=0.514*
Normalization: F(1500\AA) = 3.4E-11 erg/cm2/s/A, "Bandpass selected above in Question-1"
Std airglow, bkgd, zodiacal

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	ACS-F435W-short	ANY	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 3-9 in 2018_visit4 (06)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
5	ACS-F550M-long	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit4 (06)	65 Secs (65 Secs) *[==>]*	***[1]***
6	ACS-F550M-short	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2018_visit4 (06)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
7	ACS-F850LP-short	ANY	ACS/WFC, ACCUM, WFC	F850LP			Prime + Parallel Group 3-9 in 2018_visit4 (06)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
8	WFC3-F336W-short	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit4 (06)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
9	WFC3-F336W-med	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2018_visit4 (06)	5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 14889, 2019_visit1 (07) Thu Apr 18 21:00:29 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS, ACS/WFC, STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD93129A	RA: 10 43 57.4620 (160.9894250d) Dec: -59 32 51.27 (-59.54757d) Equinox: J2000	Proper Motion RA: -5 mas/yr Proper Motion Dec: +17 mas/yr Parallax: 0.0" Epoch of Position: 2000	V=7.31+/-0.02 O2If*; E(B-V)=0.514 \pm 0.010 ; F(1500A)=3.4E-11 erg/cm2/s/ A	Reference Frame: ICRS

Comments:
Category=STAR
Description=[SUPERGIANT O]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	ACQ1 (STIS.ta.847659)	(1) HD93129A	STIS/CCD, ACQ, F28X50OII	MIRROR				0.3 Secs (0.3 Secs) *[==>]*	***[1]***
2	ACQ2 (STIS.sp.847653)	(1) HD93129A	STIS/CCD, ACQ/PEAK, 0.2X0.06	G430L 4300 A				0.5 Secs (0.5 Secs) *[==>]*	***[1]***
3	SCI-STIS (STIS.sp.847905)	(1) HD93129A	STIS/FUV-MAMA, ACCUM, 0.2X0.06	E140M 1425 A			Prime + Parallel Group 3-9 in 2019_visit1 (07)	537 Secs X 3 (1611 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	***[1]***

Comments: Input target parameters for ETC:
Point source, default settings
Castelly & Kurucz for O3V star
*Rv=4.0, *before* normalization; EBV=0.514*
Normalization: F(1500\AA) = 3.4E-11 erg/cm2/s/A, "Bandpass selected above in Question-1"
Std airglow, bkgd, zodiacal

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
4	ACS-F435W-short	ANY	ACS/WFC, ACCUM, WFC	F435W			Prime + Parallel Group 3-9 in 2019_visit1 (07)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
5	ACS-F550M-long	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2019_visit1 (07)	65 Secs (65 Secs) *[==>]*	***[1]***
6	ACS-F550M-short	ANY	ACS/WFC, ACCUM, WFC	F550M			Prime + Parallel Group 3-9 in 2019_visit1 (07)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
7	ACS-F850LP-short	ANY	ACS/WFC, ACCUM, WFC	F850LP			Prime + Parallel Group 3-9 in 2019_visit1 (07)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
8	WFC3-F336W-short	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2019_visit1 (07)	0.5 Secs (0.5 Secs) *[==>]*	***[1]***
9	WFC3-F336W-med	ANY	WFC3/UVIS, ACCUM, UVIS	F336W	FLASH=12		Prime + Parallel Group 3-9 in 2019_visit1 (07)	5 Secs (5 Secs) *[==>]*	***[1]***

Orbit Structure